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54 Cutting, grinding and milling.

57 A cutting, grinding or milling machine comprises a chuck (62) for holding a workpiece (20), a cutting, grinding or milling tool spindle (12) positioned, in relation to the chuck (62), so that the tool (14) may be brought into contact with such a workpiece (20) when it is held by the chuck (62), and drive means (17) connected to bring about relative movement between the spindle (12) and the chuck (62) such that the contact between the tool (14) and the workpiece (20) when the machine is in use moves in a generally circular path around the workpiece (20). A coolant nozzle manifold (40) is mounted to direct coolant at such contact, the chuck (62) and the manifold (40) being rotatable relative to one another to enable the manifold (40) to keep coolant trained on such contact as it moves around the workpiece (20). A cam (44) is fixed relative to the manifold (40), and is engaged by a sleeve (15) surrounding the spindle (12) to advance or retard relative rotation between the workpiece (20) and the manifold (40) in dependence upon relative radial movement between the tool (14) and the workpiece (20) when the machine is in use, to keep the coolant directed at such contact notwithstanding such relative radial movement.

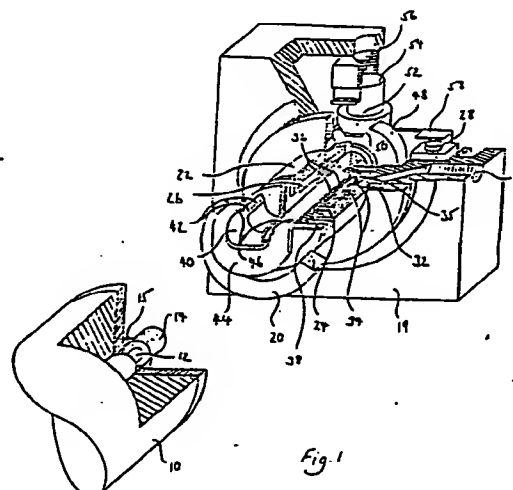


Fig. 1

acterised in that coolant directing means (40) are mounted to direct coolant at such contact, the holding means (62) and the coolant directing means (40) being rotatable relative to one another to enable the coolant directing means (40) to keep coolant trained on such contact as it moves around the workpiece (20), and in that adjustment means (44) are connected to advance or retard relative rotation between the workpiece (20) and the coolant directing means (40) in dependence upon relative radial movement between the tool (14) and the workpiece (20) when the machine is in use, to keep the coolant directed at such contact notwithstanding such relative radial movement.

3. A cutting, grinding or milling machine according to claim 2, characterised in that the adjustment means (44) comprises a coupling member (44) which couples movement between the spindle (12) and the coolant directing means (44) to advance or retard relative rotation between the workpiece (20) and the coolant directing means (40) in the manner set out in claim 2.

4. A cutting, grinding or milling machine according to claim 3, characterised in that the coupling member (44) comprises a cam (44) which is fixed relative to the coolant directing means (40), there being a part (15) which is fixed relative to the spindle axis and which engages the cam (44) to advance or retard relative rotation between the workpiece (20) and the coolant directing means (40) in the manner set out in claim 2.

5. A cutting, grinding or milling machine according to claim 4, characterised in that the cam (44) comprises curved portions which are spaced apart from one another to define a curved space therebetween which receives the said part (15) constituted by a sleeve which surrounds the spindle (12).

6. A cutting, grinding or milling machine according to claim 5, characterised in that the cam (44) comprises a U-shaped member (44) the arms of which constitute the said curved portions.

7. A method of cutting, grinding or milling a workpiece (20) along a generally circular path, characterised in that coolant is kept directed at the position of cutting, grinding or milling.

8. A method of cutting, grinding or milling a workpiece, comprising bringing a rotary cutting, grinding or milling tool (14) into contact with a workpiece (20), causing relative movement between the tool (14) and the workpiece (20) such that the contact between the tool (14) and the workpiece (20) moves in a generally circular path around the workpiece (20), characterised by directing coolant at such contact by coolant directing means (40), causing relative rotation between the coolant directing means (40) and the workpiece (20) to keep coolant trained on such contact as it moves around the workpiece (20), and advancing or retarding the relative rotation between the workpiece (20) and the

coolant directing means (40) in dependence upon relative radial movement between the tool (14) and the workpiece (20), to keep the coolant directed at such contact notwithstanding such relative radial movement.

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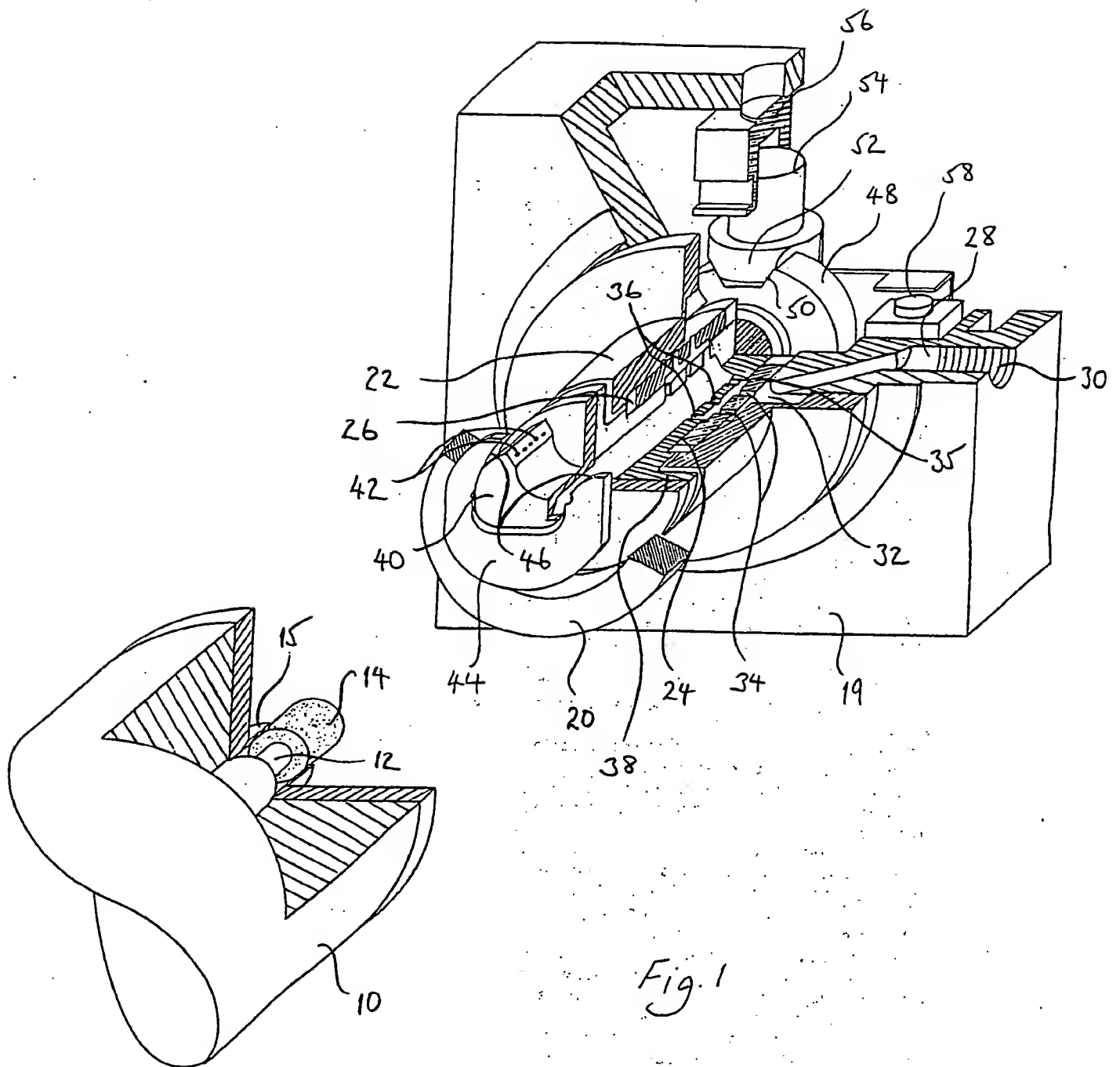
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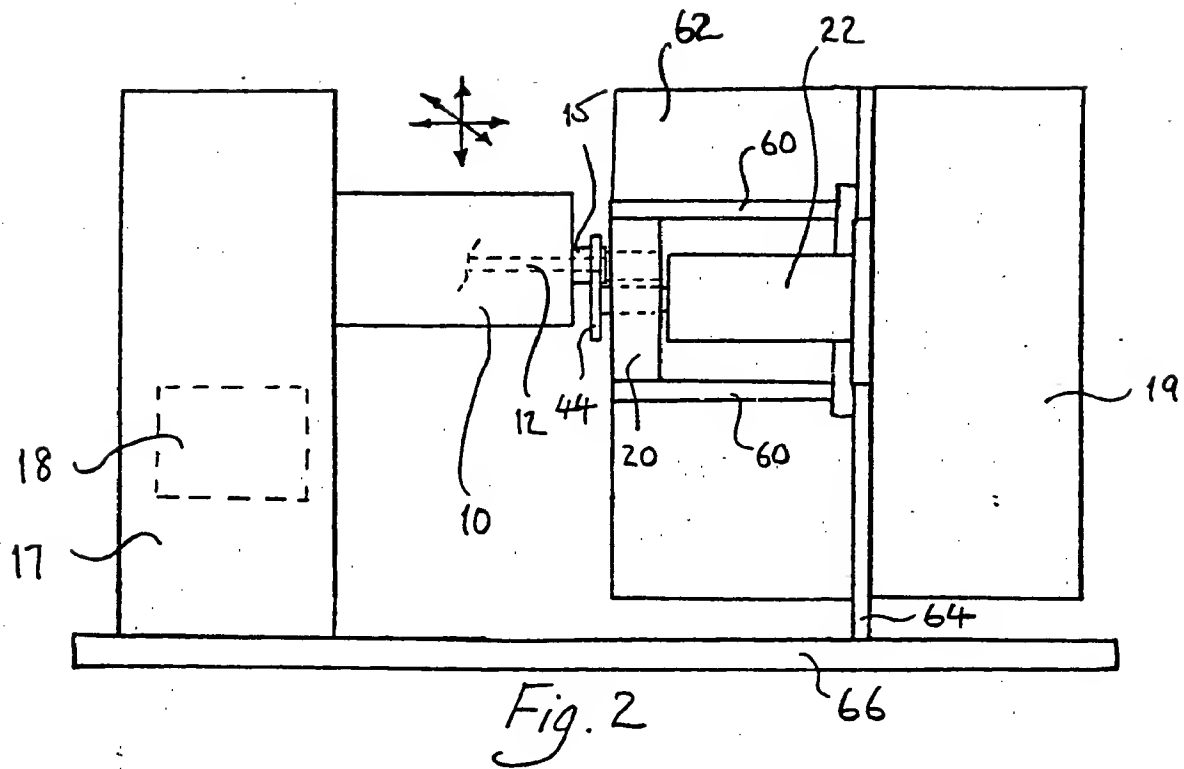
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EUROPEAN SEARCH REPORT

Application Number

EP 89 30 1993

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	EP-A-0 166 407 (MATSUSHITA)	1,7	B 23 Q 11/10 B 24 B 55/02
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A	EP-A-0 170 899 (FLACHGLASS)	1-3,7,8	
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			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			B 23 Q B 23 B B 23 C B 23 D B 24 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13-06-1989	Examiner DE GUSSEM J.L.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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